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Case Report

Spontaneous pneumoperitoneum: Report of one case

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Abstract

Pneumoperitoneum generally indicates the perforation of the hollow viscera and most cases require emergency surgical exploration and intervention. However, pneumoperitoneum may develop without viscera perforation and is then defined as "spontaneous pneumoperitoneum". Herein, we describe an elderly patient who developed spontaneous pneumoperitoneum. This case should serve to remind physicians of the possibility that spontaneous pneumoperitoneum may occur.

Keywords: Spontaneous pneumoperitoneum

1. Introduction

Pneumoperitoneum, which is defined as the presence of free air in the peritoneal cavity, generally indicates the perforation of the hollow viscera.[1] Specifically, one such clinical entity, an acute abdomen, generally requires emergency surgical exploration and intervention. However, sometimes the presence of pneumoperitoneum does not indicate the presence of an intra-abdominal perforation and thus does not require laparotomy. This condition is termed "spontaneous pneumoperitoneum".[1] The etiologies of this rare situation are various, and have been associated with intrathoracic, intra-abdominal, gynecological, and iatrogenic causes.[2] Herein, we describe an elderly patient who developed spontaneous pneumoperitoneum, which was confirmed by the fact that the results of a laparotomy were negative.

2. Case report

A 90-year-old man presented at our emergency department with progressive painful distension of the abdomen for 3 days. He had a history of rheumatoid arthritis and duodenal ulcer; he had also received colonoscopic reduction for volvulus of the sigmoid colon 3 years earlier. The patient reported he had not suffered any trauma, nor had he experienced vomiting or diarrhea. His vital signs were temperature 36.8°C, pulse rate 88 beats/min, respiratory rate 19/min, and blood pressure 138/85 mmHg. A physical examination of the patient was unremarkable except for diffuse abdominal tenderness, which was elicited on palpation. Laboratory examination results were as follows: white blood cell count, 5.0×10^9/L (72.1% neutrophils); hemoglobin, 128 g/L; platelets, 213×10^9/L; creatinine, 9.0 mg/L; fasting glucose, 1.17 g/L; and C-reactive protein, 64.9 mg/L (reference range <6 mg/L). Radiographs showed Rigler's sign, which is the visualization of the outline of the bowel wall by intraluminal and extraluminal air (Fig. 1). Computed tomography (CT) of the abdomen showed massive intraperitoneal free air, which was indicative of hollow organ perforation (Fig. 2). Due to suspicion of perforation of some part of the intra-abdominal viscera, the patient underwent

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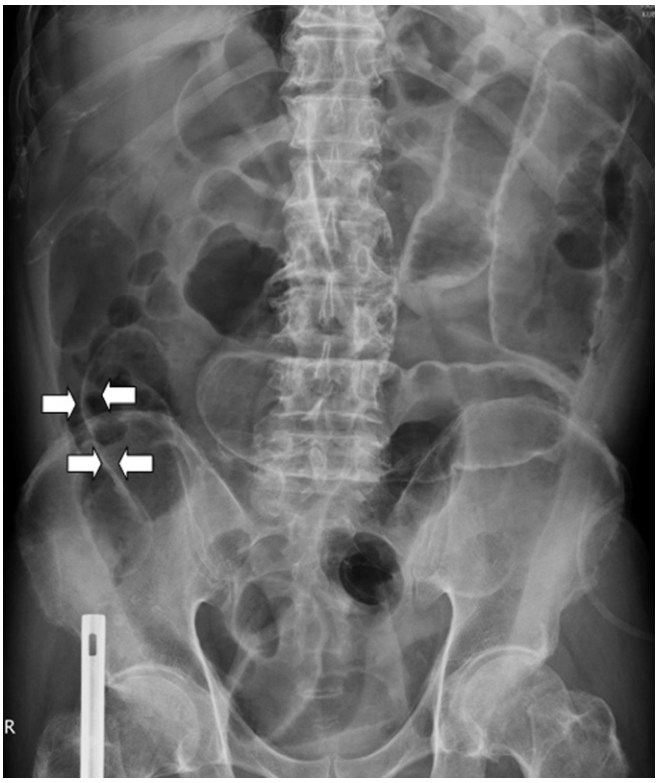

Fig. 1. Radiographs showed Rigler's sign (arrows), i.e., visibility of the bowel wall when it is outlined by intraluminal and extraluminal air.

emergency exploratory laparotomy. During the operation, the stomach, duodenum, and colon could be freely mobilized without any adhesions or the presence of ascites. No evidence of perforation was found in the distal esophagus, stomach, duodenum, or colon. Additionally, we instilled methylene blue through a nasogastric tube and no leakage from the gastrointestinal tract was found. Finally, the abdominal cavity was filled with 1000 mL of normal saline, and air was introduced through a nasogastric tube; no air leakage was detected under these circumstances either. A diagnosis of spontaneous pneumoperitoneum was made. The postoperative course was without any problems and the patient was discharged uneventfully 10 days later.

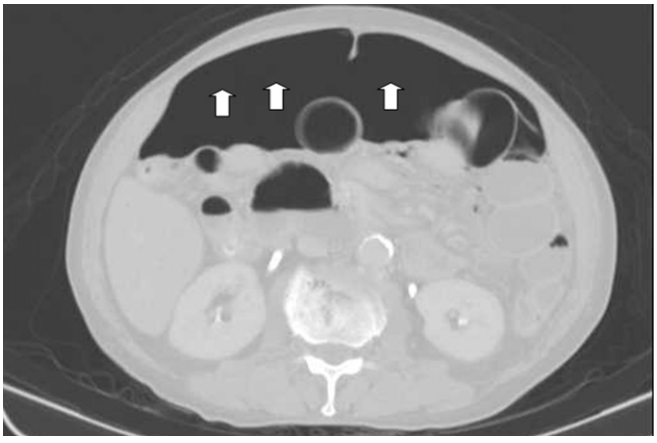

Fig. 2. Computed tomography of the abdomen showed massive intraperitoneal free air (arrows), which indicates hollow organ perforation.

3. Discussion

By excluding perforation of the hollow viscera, and any other known cause of intraperitoneal free air, such as rupture of a diverticulum or trauma, a diagnosis of idiopathic spontaneous pneumoperitoneum in the present case was established by exploratory laparotomy. This is consistent with previous reports of spontaneous pneumoperitoneum[3–5] and the clinical outcome was favorable for our patient.

Spontaneous pneumoperitoneum can be attributed to intrathoracic causes, such as pneumothorax, trauma, bronchoperitoneal fistula, pneumomediastinum, pulmonary infections, cardiopulmonary resuscitation, and mechanical ventilation, intra-abdominal causes including intestinal cystic pneumatosis, emphysematous cholecystitis, spontaneous bacterial peritonitis, liver pyogenic abscess, and endoscopic examinations, and gynecological causes including rupture of the uterus and vaginal douching.[1,2] In addition, scuba diving, adenotonsillectomy, and dental extraction[6–8] have been reported to be associated with spontaneous pneumoperitoneum on rare occasions. In our patient, no definite cause, in spite of a thorough examination, was found to be associated with his spontaneous pneumoperitoneum, so the etiology remained "idiopathic".

In the review by Mularski et al, most cases of nonsurgical pneumoperitoneum are described as occurring due to a procedural complication or as a complication of medical intervention; these included peritoneal dialysis catheter placement, gastrointestinal endoscopic procedures, mechanical ventilation, and cardiopulmonary resuscitation.[9] Among the 196 reported cases of spontaneous pneumoperitoneum, 45 underwent surgical exploration without evidence of any perforation of the viscera.[9] In clinical practice, once pneumoperitoneum is found, it is difficult to avoid emergency surgical exploration because this is needed to rule out visceral perforation. However, Karaman et al developed an algorithm for evaluation of pneumoperitoneum. This includes a thorough history taking concerning cardiopulmonary resuscitation, intubation, and ventilator use, a physical examination to investigate subcutaneous emphysema, and a number of diagnostic procedures such as paracentesis or peritoneal lavage.[3] Therefore, it is important that clinicians remain alert to the possibility of spontaneous pneumoperitoneum in order to decrease unnecessary intervention involving laparotomy.

Plain film radiography is the most common and quickest diagnostic tool when investigating pneumoperitoneum.[10] Several significant findings can be identified by plain film radiography, including subphrenic air, the falciform-ligament sign, which is visible as a longitudinal linear density on the ventral surface of the liver, the ligamentum teres sign, which is visible as a linear density running along the inferior edge of the falciform ligament, and Rigler's sign, which consists of visualization of air on both sides of the bowel wall.[10] However, there is no radiological sign that specifically indicates

spontaneous pneumoperitoneum. In conclusion, physicians need to be aware of this rare clinical entity and also need to be familiar with its associated etiologies.

Conflicts of interest

The authors have no conflicts of interest to declare.

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